25 June 1992

MEMORANDUM FOR: Members, CIE Division 6

SUBJECT: Minutes of the Annual Meeting of CIE Division 6, Princeton, NJ, USA, 19 - 20 June 1992

1. The subject meeting was held at Princeton, NJ (USA) on 19-20 June 1992. The plenary sessions were chaired by the D. H. Sliney, Director of Division 6 (Photobiology and Photochemistry),
a. Those attending the Friday sessions were:
D. Sliney, USAEHA, APG, MD, USA [Division 6 Director]
J.-P. Césarini, Rothschild Foundation, Paris, France [As. Dir.]
Barthe, Medical Academy Dresden, Germany.
Chardon, L'Oreal [for TC 6.24]
Curtis Cole, Johnson and Johnson.[for TC 6.24]
Ed DeFabo, George Washington University Medical Center.
Francois Denner, CSIR, Pretoria, South Africa
Irwin, Proctor and Gamble, Cincinnati, OH, USA [for TC 6.24]
Alistair McKinlay, NRPB, Didcot, Oxfordshire, U.K.
Maxim Mutzhas, Mutzhas Group, Munich, Germany
Hans Terstiege, BAM Berlin Germany.
Romano Mascotto, L'Oreal, Clichy, France [for TC 6.24]
Muscatiello, L'Oreal, Clichy, France [for TC 6.24]
Lucia Ronchi, National Institute of Optics, Florence, Italy
Stanfield, Schering Plough [for TC 6.24]
Fred Urbach, Temple University, Philadelphia, PA
b. Those also attending the Saturday sessions were:
George (Bud) Brainard, Temple University, Washington, DC, USA
Alan Lofberg, (S) CIE Vice-President, Technical
Bryan (AUS), CIE Vice-President, Publications
Janos Shanda, CIE Central Bureau, Vienna

2. The first plenary session began at 09:00 Friday, 19 June. Dr. Sliney explained that he had still been unsuccessful in recruitng asecretary for the Division. He also explained that Dr. Kok (SA) had found it necessary for health reasons to resign as Associate Division Director. Dr. Kok had actively sheparded TCs working on projects relating to physical aspects of photobiology (e.g., measurements, general concepts, clothing, etc.). Mr. Denner (SA) brought information related to these efforts. The other Associate Division Director (for photodermatology), Dr. J.-P. Césarini (F) was requested to report on Division activities in photodermatology.

3. Césarini said that some members of his technical committee, TC 6-26 (Dividing lines between UV-A1 and UV-A2 and UV-B) had met at the World Congress on Dermatology earlier in the week in New York and that he would continue discussions at this meeting and during a round table meeting to be held at the American Photobiology Society meeting in Marcos Island, Florida on 22 June 1992. He will prepare a draft report and attempt to obtain a consensus within Division 6 on the

two wavelengths of issue (i.e., 315 vs 320 nm to 340 nm for UV-A2. F. Urbach noted that he had found two earlier European references to a 320 nm dividing line between UV-A and UV-B rather than the CIE wavelength of 315 nm, thus arguing that this variance was not purely an American phenomenon.

4. D. Sliney reported that the report on a standarized action spectrum for melanogenesis was in the hands of the Editor (F. Wilkinson) and would not be held up for inclusion of an action spectrum for immediate pigment darkening (IPD). Césarini noted that it was time to establish other standardized action spectra: for carcinogenesis, for connective tissue damage, and for immunological effects mediated through the skin, as well as for immediate pigment darkening. It was then discussed whether these action spectra should be addressed by one committee or several, Because of the spread of expertise required, it was decided that several TCs were needed; this would also allow some action spectra reports to go forward without being delayed by a controversy over another. Césarini suggested that a separate IPD committee was needed to obtain results quickly since that action spectrum was needed for use with the draft guideline for sunscreen testing.

5. F. Urbach (USA) presented a proposal to form a new TC for considering a standardized protocol for skin carcenogenesis testing of both optical sources and chemicals. He explained that Donald Forbes (Temple University, Philadelphia, USA) was willing to chair this activity. McKinlay pointed out that any international standardization of animal research methods employing animals would have to take into account variations in animal-use regulations in different countries.

6. Results of the morning discussion were:

[1] TC for IPD [chairman to be selected by Césarini].

[2] TC for photocarcinogenesis and connective tissue damage.

[3] TC for photoimmunological effects mediated through the skin [Chaired by deFabo].

[4] TC for standardizing testing protocols for photo-carcinogenesis. [Chairman, Donald Forbes, USA]. The terms of reference will include standardization of source spectral characteristics.

[5] Mutzhas suggested a new TC to standardize the testing of "non-applied sunscreens," i.e., umbrella and tent materials, and fabrics other than clothing that are used for UVR protection. [job to co-ordinate this given to Francois Denner of South Africa.]

7. Dr. Ed DeFabo, formerly of the FDA and now at George Washington University, Washington, DC, presented an invited talk on photoimmunology.

a He pointed out that most effects are caused by UVB [within his definition: 280-320 nm]. Historically, Fisher and Kripke were the first to show experimentally in their studies with FS sunlamps that tumours on the ears and backs of mice were very antigenic. If tumor cells were implanted in another mouse, the tumour would normally be rejected. However, if the mouse was pre-exposed to small doses of UVR prior to injection of tumor cells, then that mouse would accept the tumor. Not only tumor growth, but also contact hyper-sensitivity [CHS] tests showed a similar

immunosuppressive effect of UVR; i.e., the pre-irradiated mouse showed no reaction. He employed fluorescent sunlamps (FS20) with and without 5 mil mylar film filters to block the UV-B. He noted that a fractionation of dose had no effect on the results. The UVR dose for a 50% suppression was 1500 J/$m^2$ [CHS] and for tumor rejection was: 40,000 J/$m^2$

b. DeFabo suggested possible effects: Direct effects on circulating immune cells [unlikely]; interaction with skin immune cells [also unlikely]; release of inflammatory mediators or cytokines, and specific photoreceptor at the surface of the skin which initiates a series of events.

c. With regard to the spectral effectiveness for the CHS reaction, the most effective wavelength was shown to be approximately 270 nm. When they looked for an absorbing chromophore, they noted that urocanic acid absorption appeared to match the action spectrum. The spectral source used in their studies was a xenon-arc lamp with a series of narrow band-pass filters. He argued that urocanic acid was in the `trans' isomer prior to irradiation and that UVR irradiation isomerized the molecule to the `cis' form.

8. During the afternoon of Friday, two Technical Committees met: TC-24 met to discuss UV-A sunscreen testing and TC 6-18 [L. Ronchi] met to discuss the draft report on spatial and temporal effects of light upon photobiological effects. However, prior to initiating the TC meetings, **J.-P. Césarini** reviewed the progress of other TCs. He explained that TC 6-20 (Phototoicity/Photoallergy) continued its project of preparing its list of photosensitizers and reviewing data. The TC had collected a list of 1500 chemical compounds which have been reported to pose a phototoxic/photoallergic risk, and this list will be refined; however, there is also a European Community (EC) effort to categorize these agents, to report in 1993. **Cé**sarini therefore said that TC 6-28 would not resume active work until after this report is issued in 1993. He expected the report in 1994. Someone noted that in the US, the FDA had recently produced a little booklet listing photosensitizers; however, F. Urbach felt that the booklet reflected a literature search without a critical review. The newly issued CIE report on the UV-B testing of sunscreens report had drawn much attention and it was explained how to purchase it. He stated that TC6-27, UV Sunscreen Standard was bow in draft for discussion.

9. The TC 6-24 meeting discussed UV-A sunscreen testing. Dr. Frederick Urbach (USA) presented a briefing on the difficulties of specifying UV-A sunscreen protection factors. He pointed out that the contribution to erythemal effective radiant energy was less than 10 % of the total solar erythemal dose. Therefore, if one used an SPF exceeding 10, **then a very high exposure of UVA was impossible**, since one can only get an MED (based on the McKinlay/Diffey action spectrum) if 85% of the erythemally effective UVR is in the UVB. Urbach argued that Because the skin aging action spectrum is approximately the same as the erythemal action spectrum, this one action spectrum was adequate for assessing sunscreen effectiveness. It was noted by Irwin (USA) that 4 methods had been proposed for sunscreen assessment: the phototoxic method, delayed pigmentation, immediate pigment darkening (IPD), and the erythemal response. The important choices are: the light source and the endpoint. A very potent light source is needed to produce the UVA erythema endpoint of 10-20 J/$cm^2$.

10. Dr. Curtis Cole (USA), a researcher from Johnson and Johnson presented some data on an inter-laboratory comparison of erythemal protection factors that showed good agreement. He described

his ideas regarding test methods. He argued that sunburn and tanning action spectra were parallel to one another with reference to the action spectrum of Parrish et al. He used a xenon-arc lamp with a Schott WG335 3-mm filter. Berger uses a Schott WG345 filter in his solar simulator. Cole measured 82.5% UV-A1 in sunlight vs, 87.2% UV-A1 for his filtered arc. He reported on a Round-Robin test, participated in by five laboratories to examine the repeatability of sunscreen testing of three concentrations of oxybenzone with a total of 38 subjects. The participants in the Round Robin looked at responses for erythema or for a tanning endpoint in human skin types I-III. He also explained that there had been an inter-comparison with eight laboratories using IPD as the end point.

11. C. Irwin (USA) of Proctor & Gamble presented data on the use of immediate pigment darkening (IPD) as an endopoint when testing the protection factor of oxybenzone; however his report showed that the placebo results showed the same protection factor as the 2% oxybenzone. This led to an extensive discussion as to how this result could occur. The IPD was measured 45 s after the exposure was terminated.

12. Dr. Chandon (l'Oreal, France) reported on the kinetics of IPD which showed that the IPD effect was highly varying during the first minutes and hour after exposure; however, beyond two hours the effect was stable for several days. The "color" of IPD appears to be bluish and not yellowish-brown as melanin. This appeared to explain the curious results of the tests performed with the criteria of evaluating the IPD at 45 s post-exposure. The dose response depends on the time to viewing: after 2 h the dose response is essentially linear. Reciprocity is valid only after 2 hours and not for shorter times after exposure. The proposed protocol from Masciotto of L'Oreal was based upon these kinetic studies [published in the proceedings of the UVA Conference held in San Antonio 1991]. He recommended a UV-A source which was a xenon arc filtered by Schott UG11 and WG335 glass filters to achieve a UV-A dose of 4 to 30 $J/m^2$ with a 50% progression in doses, and then observe at the skin 2 hours post-exposure.

13. F. Urbach commented that it would be valuable if a report was prepared which provided the spectral data on lamps which were typically used in photodermatology/photobiology expermentation and testing.

14. After a Division 6 Dinner on Friday evening, the meeting resumed in plenary session on Saturday, 20 June. D. Sliney suggested the formation of a new TC on the safety of lamps which could consider a standardized means of evaluating potentail hazards and perhaps include a classification of lamps by potential hazards [see enclosed proposal to the CIE Board of Administration]. He then presented a general lecture on optical radiation hazards.

15. G. Brainard USA) presented a lecture on light effects upon the neuroendocrine system as mediated through the retina. He spoke on both animal and human studies which showed the suppression of pineal production of serum melatonin by light exposure. He pointed out that many major accidents occured during the night shift and that night shift work accounted for 20% of all US workers. The esstimated cost to the US economy of shift work problems was measured in $ billions. He also reported on a study carried out in Philadelphia [288 donors of eyes] on age related changes in the transmission of the human lens [within the wavelength band of 200-2500 nm].

16. G. Brainard then presented an update on the activities of TC 6.11. The members have not met.

All communications were by correspondence or by fax. His reference data base now stands at 1400 references. Work was currently in progress to:

[1] Complete the master data list

[2] Edit the master list

[3] Merge summary statements into a single document.

17. D. Sliney then led a general discussion on the progress to date on TC work within Division 6:

a. TC 6.04 **Action Alastair to contact Charles Meulemans re progress on TC 6.04 and report to Dave Sliney.**
b. TC 6.10 out for vote

c. TC 6.13 ??

d. TC 6.14 For editing

e. TC 6.15 Work has not progressed Peter Wainwright to visit Dave Sliney's lab. and maybe jointly treat problem.

f. TC 6.17 Document to be reviewed.

g. TC 6.21 UVA-draft

h. TC 6.23 Plant Photosynthesis

i. TC 6.24 Sunscreens

j. TC 6.25 Solar radiometry [Kaase]

k. TC 6.26 UVA 1/2 Meetings in process

l. TC 6.27 Erythema standard Draft a short version and send to Schanda for his comments ::: Write a rationale document based on the original 1987 paper and add a section on how the reference action spectrum has been utilised and by whom.

m. TC 6.28 Sunscreen testing :: close to agreement on choice of testing method.

n. TC 6.29 Clothing ::: new chairman from South Africa

o. TC 6.30 Eye dosimetry :::::: Wong has sent material [CR 39] to Dave Sliney for testing especially spectral response.

p. TC 6.31 Khomoto new proposal for TC to be remitted to Div. 2.

18. The following new Technical Committees proposals were voted upon:

[1] UVR Disinfection voted on and agreed

[2] To develop standardised action spectrum for immediate pigment darkening [chair Chandon] voted on and agreed.

[3] Photoimmunology [chair DeFabo]

[4] To develop standardised testing protocol for photocarcinogenesis and connective tissue damage [Dan Forbes] agreed formation.

[5] To investigate the properties of materials for use in solar UVR shading devices.

Mutzhas agreed as the Associate Director for measurements, physical processes etc.

Proposals for the next meeting place ::::: Edinburgh [Lux Europa] ::::: Munich [UVR ozone depletion meeting]

Dave Sliney to ballot Division members re which venue they want.

Action Alastair to contact CIBSE and check on the feasibility of Edinburgh